# The Virtual Heliospheric Observatory (VHO) and Collaborative Sun Earth Connector (CoSEC):

## Enabling New Science with Heterogeneous and Distributed Data

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# VHO Information

- Visit VHO homepage:

  http://vho.nasa.gov
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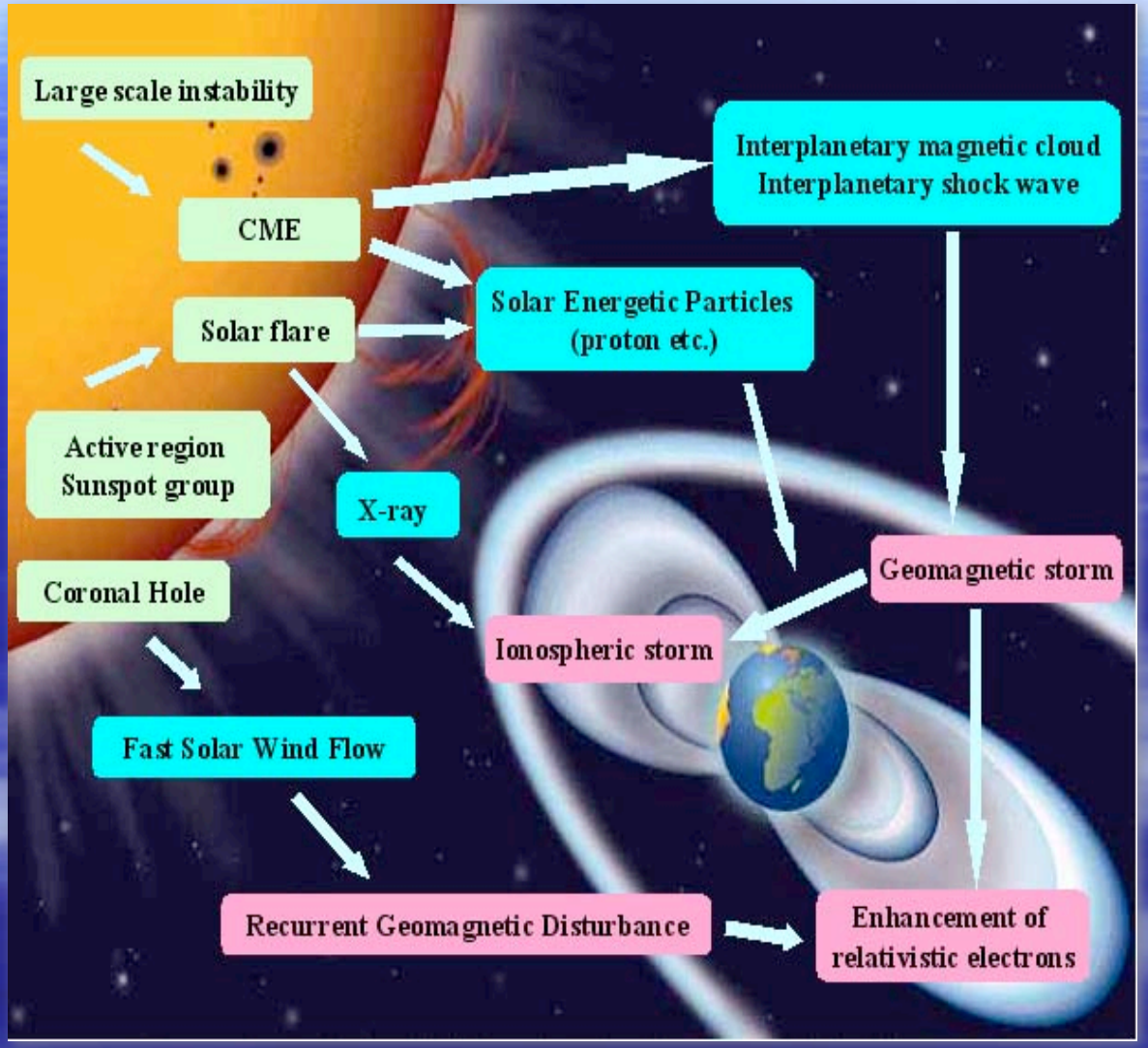
# Why Virtual Observatories?

- Many datasets with large volumes
- Data sites distributed worldwide
- Stored in a variety of formats
- Accessible through a wide variety of interfaces




IN31B-1143 (3)

# What is the goal of the VHO?

- Simple, unified method of access to all heliospheric data sets and tools.
- Provide community with access to same data products as PI teams use.
- Make data publicly available as quickly and easily as possible.

# Current and Future Types of VHO Searches

- Science driven data searches:

| Time | Space | Measurement Types |
|---|---|---|
| 1. Date/Time | 1. GSE location | 1. Magnetic Field |
| 2. Bartel Rotation | 2. GSM location | 2. Thermal Plasma |
| 3. Carrington Rotation | 3. HGI location | 3. Energetic Particles |
| | 4. Spatial Region | |

Other: 1. Event Lists

- Spatial Region search allows for keyword search
  Examples:
  Bow Shock to ~60 Re, L1, Inner Heliosphere (< 0.8 AU)
  Mid Heliosphere (0.8 AU to 5 AU), Outer Heliosphere (> 5 AU)

Note: solar wind data only, magnetospheric data removed

# What is CoSEC?

- Developed by a research team at the Lockheed Martin Solar and Astrophysics Lab whose objective is to enable the integration and coordination of data analysis tasks across disparate data sources.
- Visit the CoSEC homepage at: http://cosec.lmsal.com/

# Benefits of CoSEC

- CoSEC is a powerful tool used to access any services available on the web.
- CoSEC allows services to be connected with minimal setup. For example, the output of one service can be sent as the input into another.
- CoSEC has a straight forward graphical user interface that enables developers to quickly create a model of the services they wish to integrate.

# Combining VHO and CoSEC

## Spectrum of Interfaces

Simple

Complex

| Web Based Interface | CoSEC | Application Programming Interface (API) |
|---|---|---|
| • Access all types of searches and services from VHO web page | • CoSEC Client software being written to access VHO | • Access VHO from your own software |

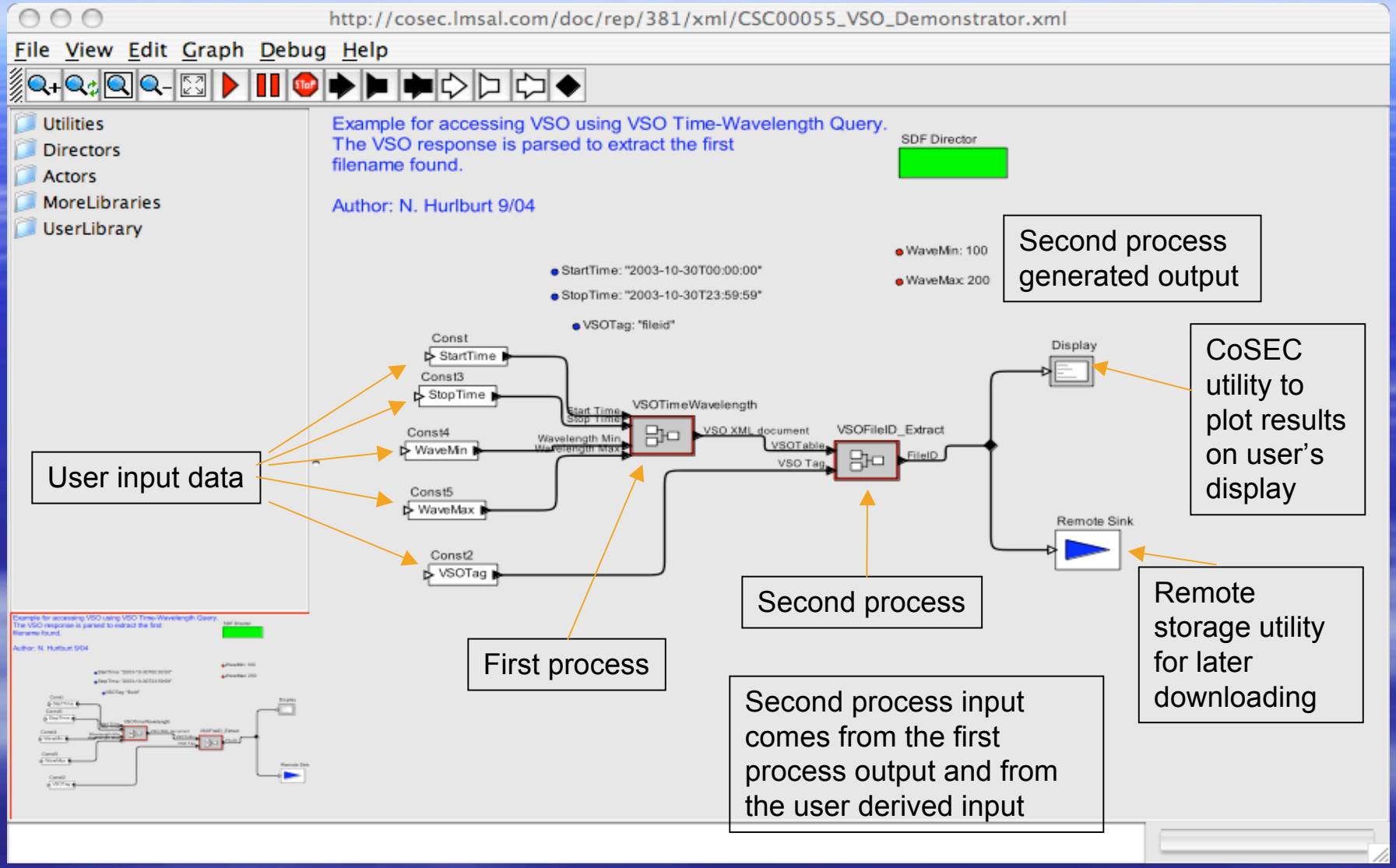
# CoSEC interface to VHO

- CoSEC interface offers ability to use services that are independent of VHO
- CoSEC allows for combining of independent services
- CoSEC interface is integrated with existing services such as SSCWeb

# CoSEC interface to VHO (continued)

- VHO team will be providing services that offer automated data processing that is compatible with VHO queries:
  - Coordinate Transformations - 12 coordinate systems
  - ASCII Subsetting - merge multiple daily files into one ASCII file or subset a few hours from daily files

# CoSEC Graphical User Interface



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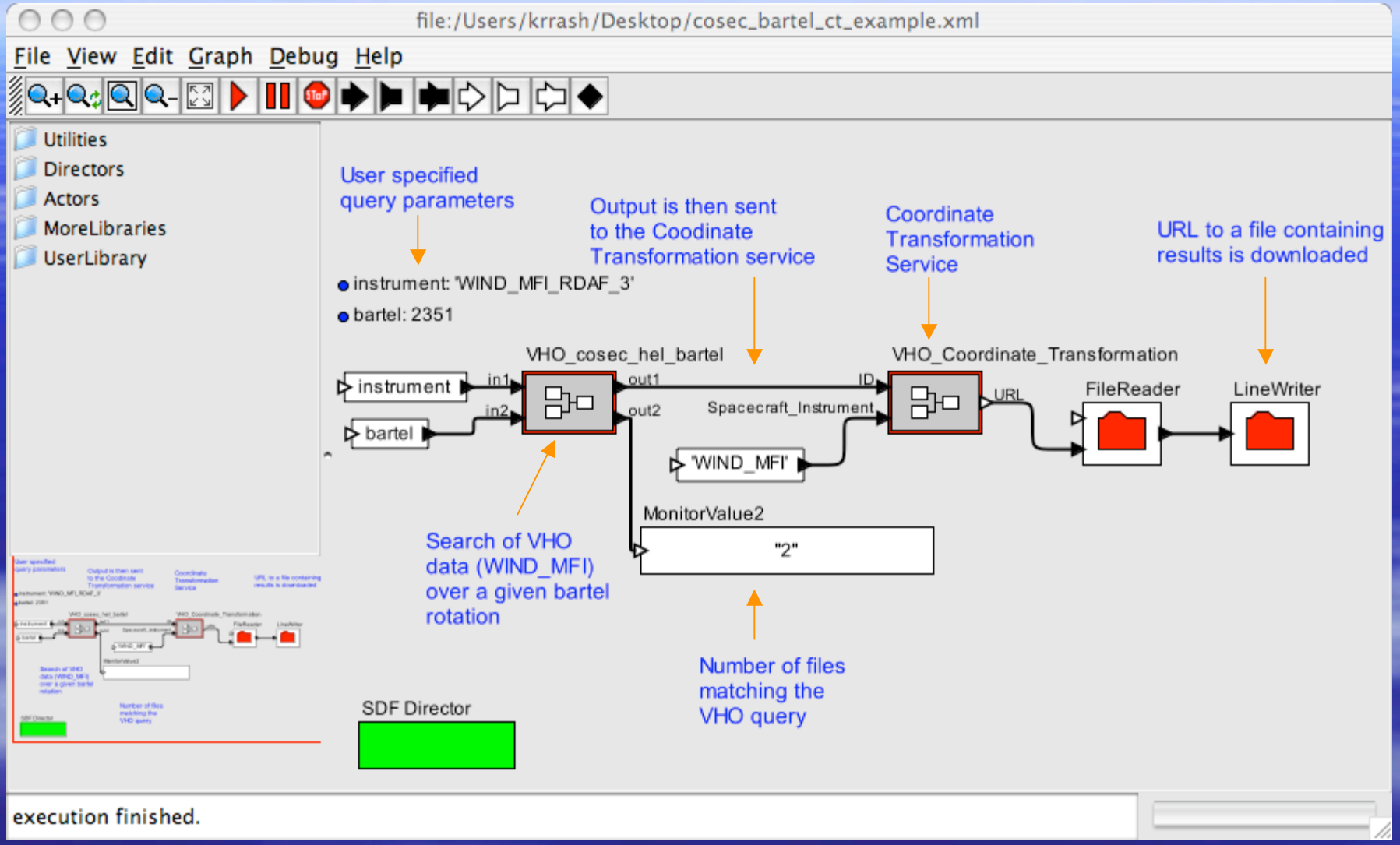

# Why CoSEC is Used?

- CoSEC does not require the user to write the service integrating software, instead they can simply download CoSEC and use the libraries contained within it.
- VHO is collaborating with CoSEC to create a CoSEC library
- CoSEC allows the user to combine services already available in its library or the user can create their own and integrate them into CoSEC.

# Advantages of Using CoSEC with VHO

- By making VHO available through CoSEC, it can be used with other services created by outside parties.
- For example, there will be a number of services available that are capable of processing and analyzing data.  But first they need to find relevant data.
- The VHO allows for this searching and retrieval of data, thus the power of the VHO can be combined with existing services for increased productivity and research efficiency.